SERVICE MANUAL

PM593

4822 725 50886

marantz®

model PM593

Digital Audio / Video Master Amplifier

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Parts can be ordered either by mail or by telex. In both cases, correct part number has to be specified.
The following information must be supplied to eliminate delays in processing your order:

1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which part is required
5. Way of shipment
6. Signature: any order form or telex must be signed otherwise such part order will be considered as null and void.

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Parts may be ordered at the following addresses:

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Sandstuveien 40
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GREAT BRITAIN
MARANTZ AUDIO U.K. Ltd
Unit 15/16
Saxon Way Industrial Estate
Moor Lane
Harmondsworth UB7 OLW
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GREECE
SHERTON ELECTRONICS S.A.
P.O.Box 21025
Hippocratus Street 188
Athens 11471
Greece
Telex: 216.795

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Ussama Building
Fahd al Saleem Street
P.O.Box 23781
Safat-Kuwait
Telex: 22694

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Via Chiese, 74
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Newville 21114
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Ignacio Iglesias 10
Badalona (Barcelona)
Spain
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DIVISION OF PHILIPS
Försäljning AB
Tegeluddsvägen 1
S-115 84 Stockholm
Sweden
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6 Blok N°6310
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All of the above locations are fully equipped to take care of your total service needs. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country. In the event that there is no service location listed for your country, please, contact the nearest facility for the necessary assistance.

In case of difficulties, do not hesitate to contact the Technical Department at above-mentioned address.

TECHNICAL SPECIFICATIONS (DIN)

Audio Section

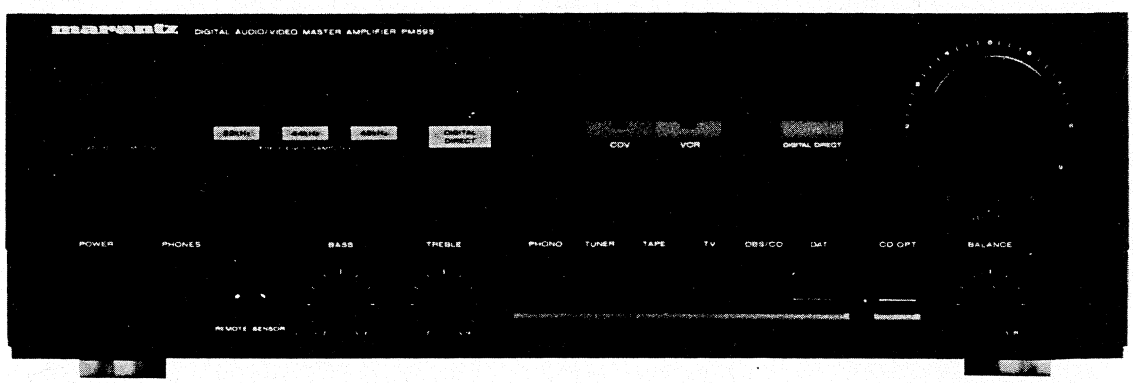
Total System Power (RMS-EIAJ, 6 Ohms)	: 140W
Power output (DIN 8 Ohms)	: 2x40W
Total Harmonic Distortion (at 1/2 rated output)	: 0.05%
Intermodulation Distortion (at 1/2 rated output)	: 0.05%
Signal to noise ratio	
Phono	: 75 dB
CD Direct/High level inputs	: 100/90 dB
Frequency response (0.5 dB limits)	: 10 Hz – 50 kHz

Digital Section

Inputs	: 2 Coaxial 1 optical
Sampling frequencies	: 32, 44.1, 48 kHz
Dimensions (WxHxD)	: 360x110x300 mm
Weight	: 6.8 kg

Specifications and appearance are subject to change for modification without notice.

MODEL PM593 DIGITAL AUDIO/VIDEO MASTER AMPLIFIER



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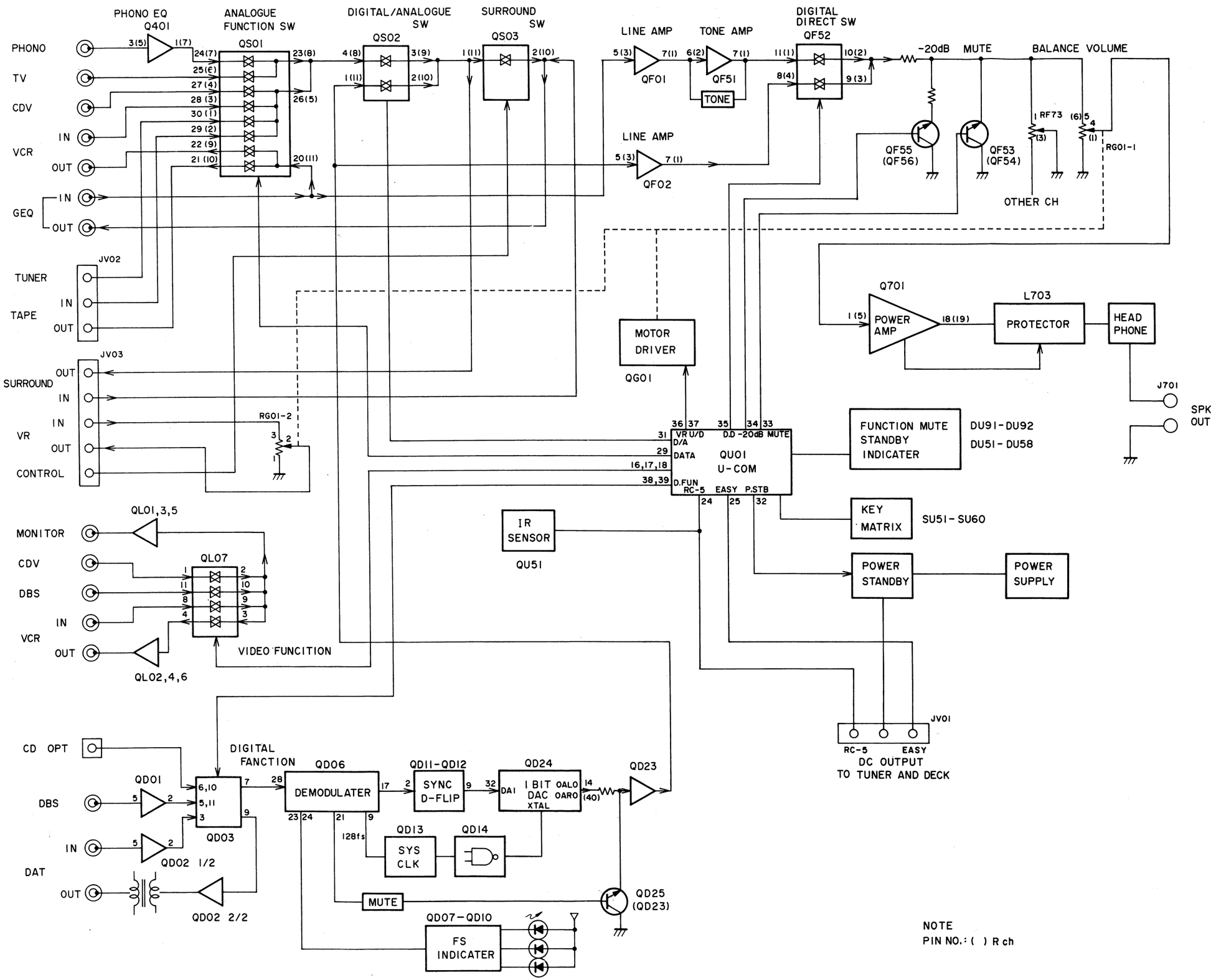
1. BLOCK DIAGRAM



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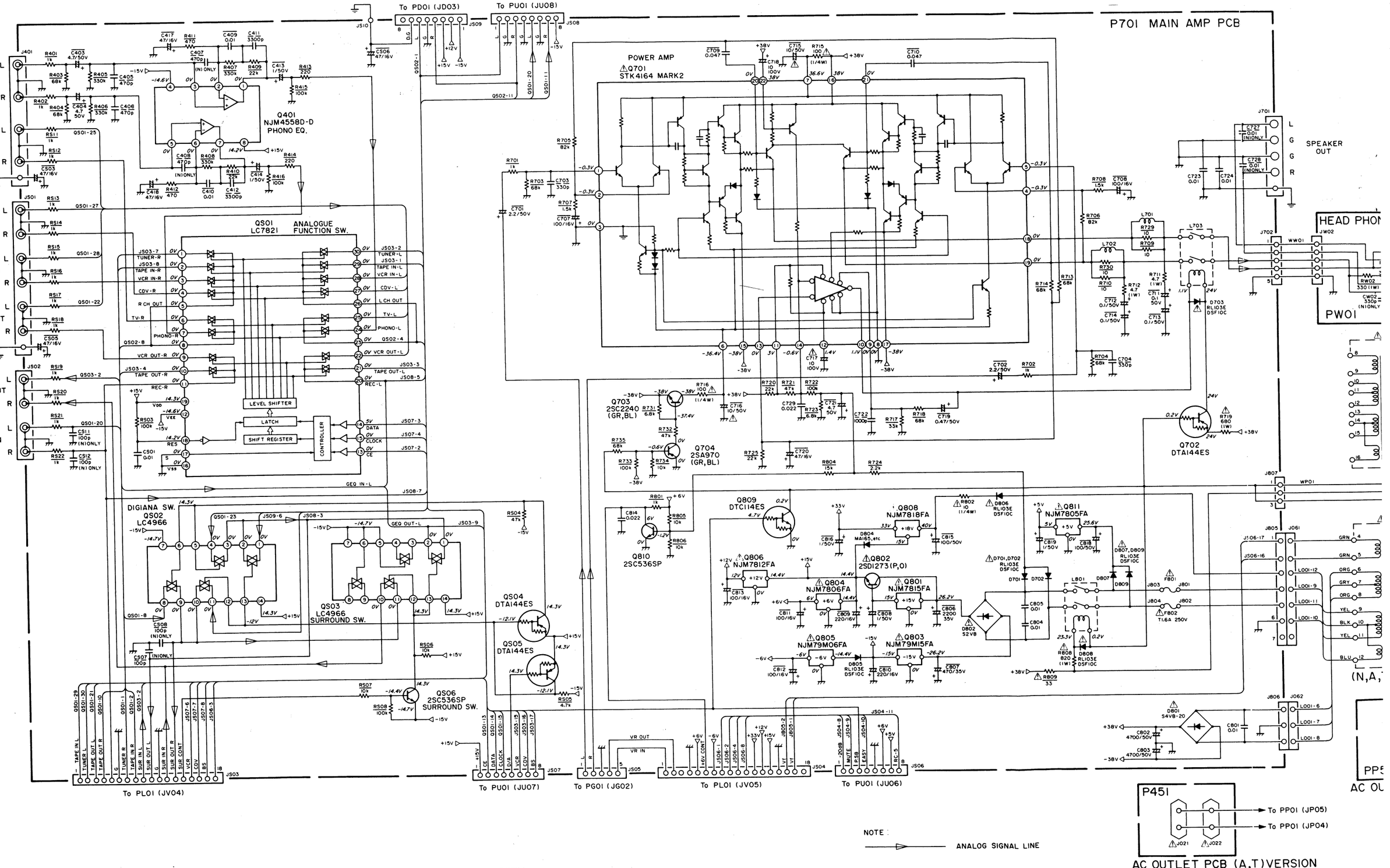
2. SCHEMATIC DIAGRAMS AND PARTS LOCATIONS (Pattern Side)



NOTE ON SAFETY:
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠ . Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

P701 MAIN AMP PCB

POWER AMP
⚠Q701
STK4164 MARK2

Q703
2SC2240
(GR,BL)

Q704
2SA970
(GR,BL)

Q810
2SC536SP

Q809
DTC114ES

Q808
NJM7818FA

Q802
2SD1273(P,O)

Q806
NJM7812FA

Q804
NJM7806FA

Q801
NJM7815FA

Q805
NJM79M06FA

Q803
NJM79M15FA

Q811
NJM7805FA

Q702
DTA144ES

SPEAKER OUT

HEAD PHONE JACK PCB
PW01

HEAD PHONE

(E) VERSION

POWER SWITCH PCB
PP01

(N,A,T) VERSION

AC OUTLET PCB (N) VERSION
PP51

AC OUTLET PCB (A,T) VERSION
P451

To PG01 (JG02)
To PL01 (JV05)
To PU01 (JU06)
To PP01 (JP02)
To PP01 (JP04)
To PP01 (JP05)

NOTE :
ANALOG SIGNAL LINE

2SC2240
2SA970
2SC536SP
2SD1273

DTC114ES
DTA144ES

NJM7805FA, NJM7806FA
NJM7812FA, NJM7815FA
NJM7818FA

NJM79M06FA, NJM79M15FA

SIDE VIEW
STK4164 MARK2

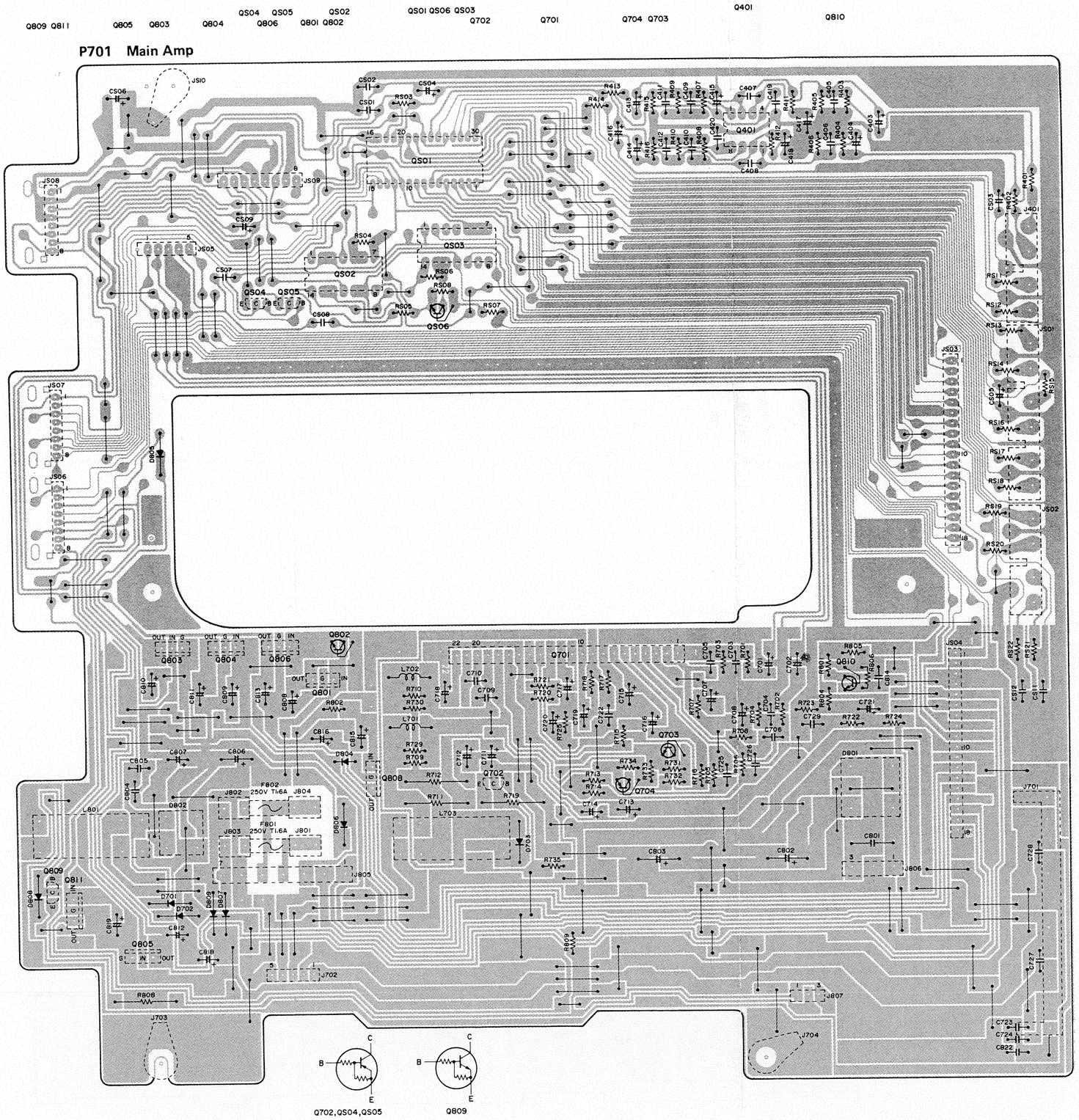
NJM4558D-D

LC4966

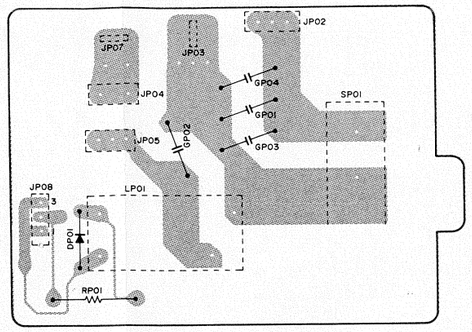
LC7821

:al shock hazard. Only original parts should
t marked with symbol ⚠. Any other com-
than original type), may increase risk of fire

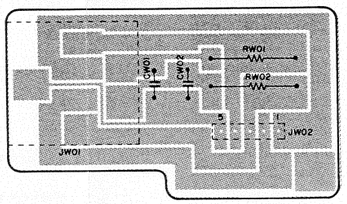
P701 Main Amp



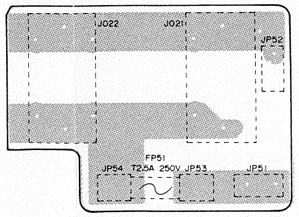
PP01 Power Switch



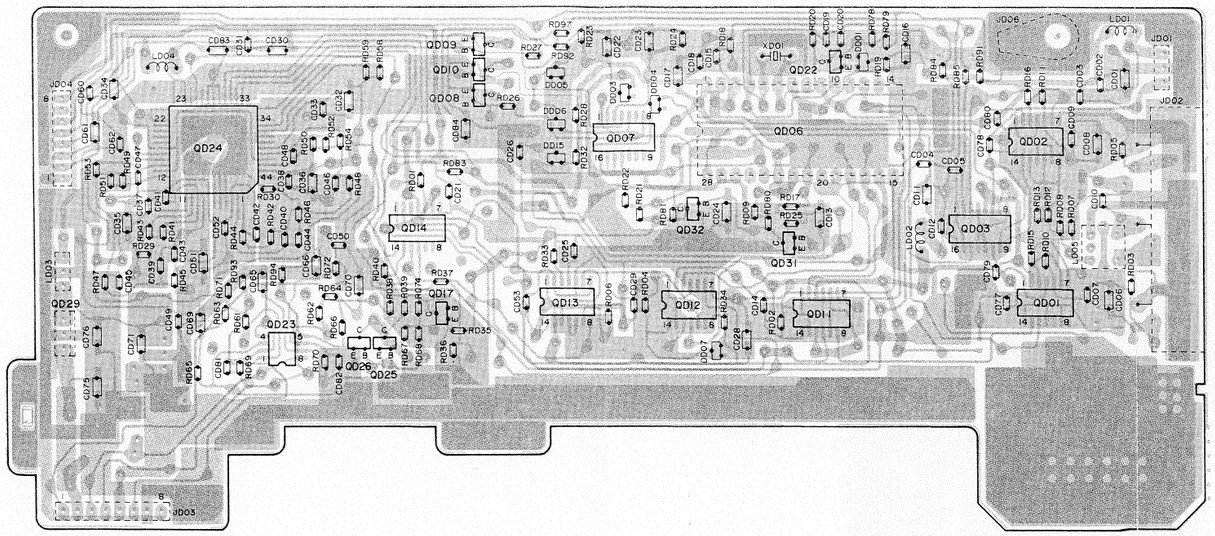
PW01 Head Phone Jack



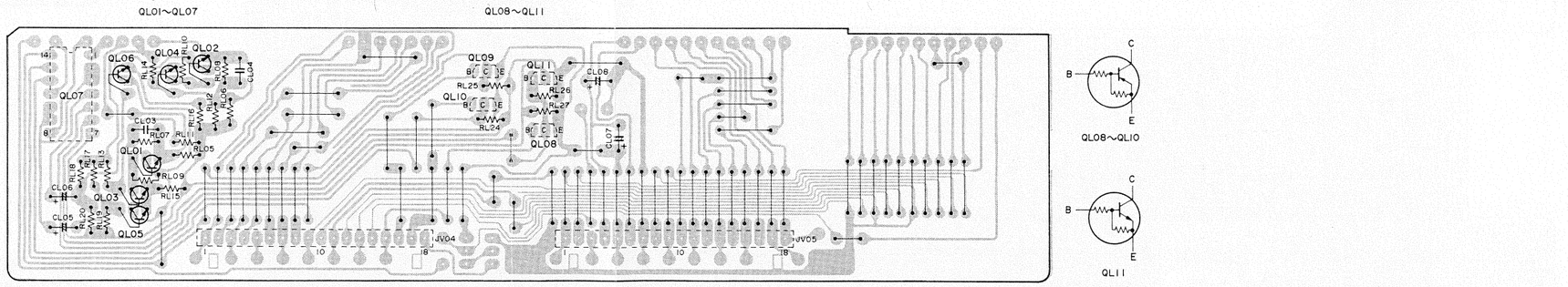
PP51 AC Outlet



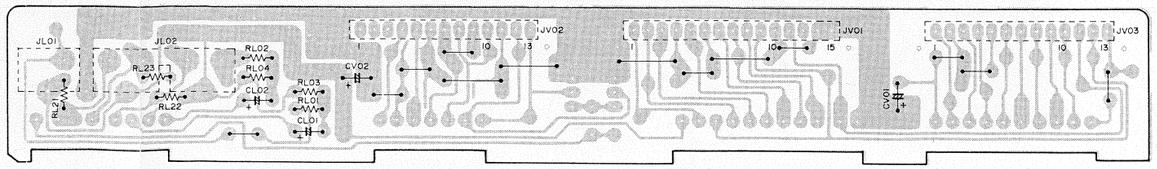
PD01 DAC

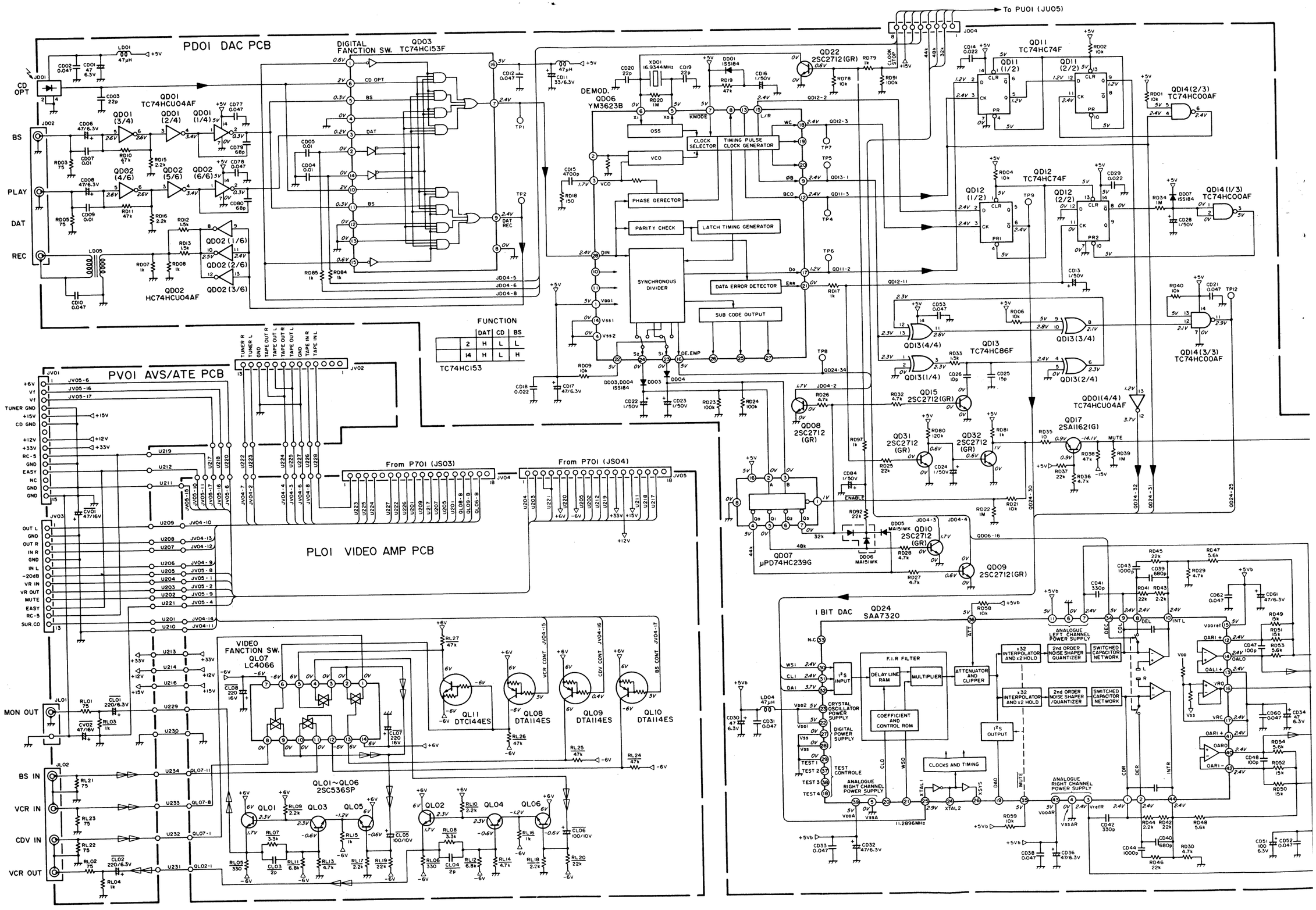


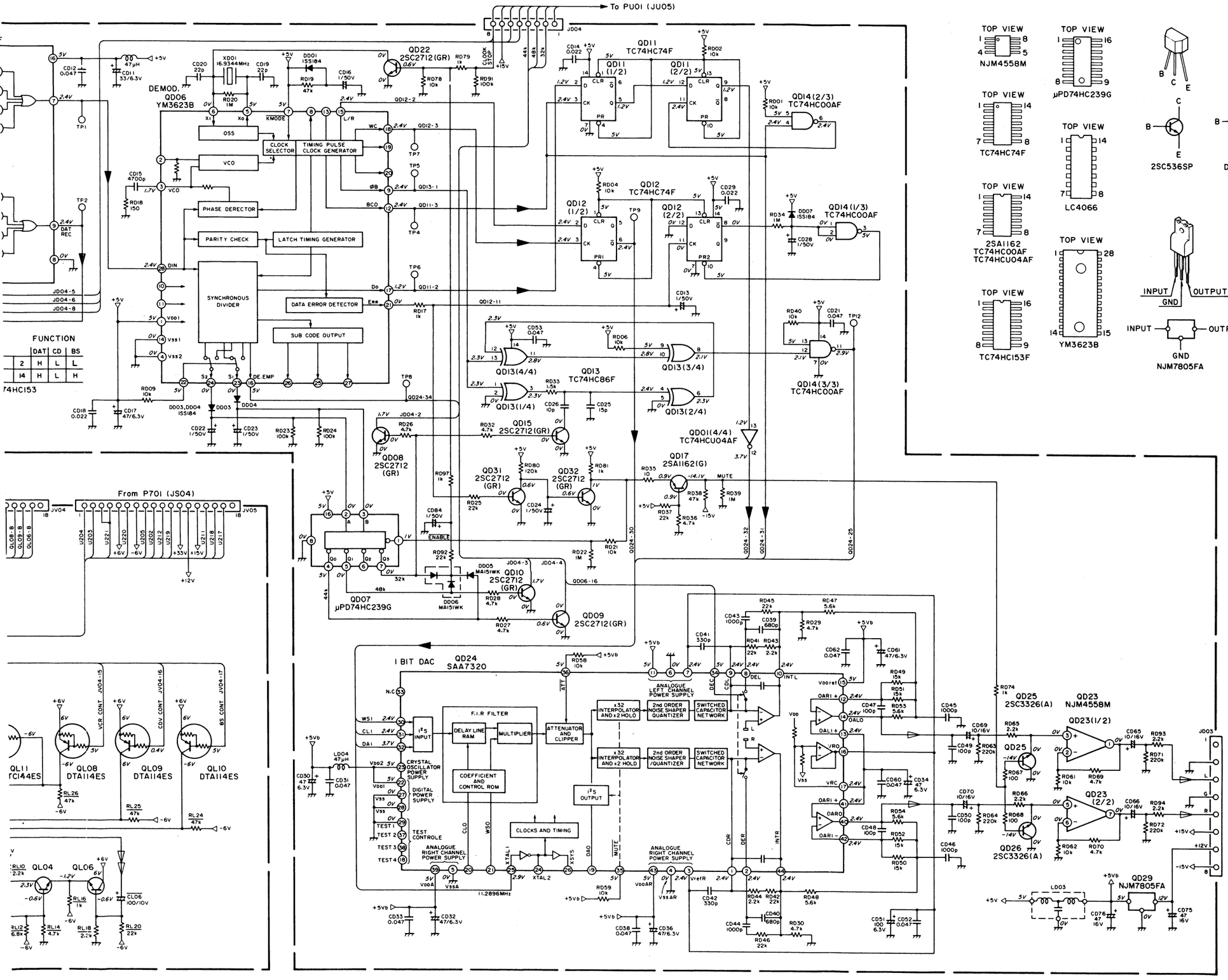
PL01 Video Amp

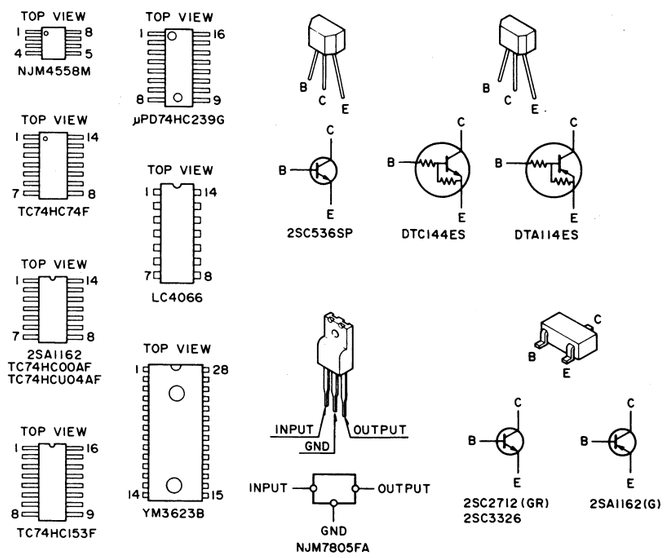


PV01 AVS/ATE




PD01 DAC PCB
DIGITAL FANCTION SW.
QD03 TC74HC153F
CD OPT
BS
PLAY
DAT
REC
QD01 TC74HCU04AF
QD02 HC74HCU04AF
FUNCTION
TC74HC153
DEMOD. QD06 YM3623B
OSS
VCO
CLOCK SELECTOR
TIMING PULSE CLOCK GENERATOR
PHASE DERECTOR
PARITY CHECK
LATCH TIMING GENERATOR
SYNCHRONOUS DIVIDER
DATA ERROR DETECTOR
SUB CODE OUTPUT
QD22 2SC2712(GR)
QD11 TC74HC74F
QD12 TC74HC74F
QD14(2/3) TC74HC00AF
QD14(1/3) TC74HC00AF
QD13(4/4)
QD13(3/4)
QD13(2/4)
QD13(1/4)
QD13 TC74HC86F
QD14(3/3) TC74HC00AF
QD15 2SC2712(GR)
QD17 2SA1162(G)
QD01(4/4) TC74HCU04AF
QD08 2SC2712 (GR)
QD31 2SC2712 (GR)
QD32 2SC2712 (GR)
QD10 2SC2712 (GR)
QD09 2SC2712(GR)
QD07 μPD74HC239G
To PU01 (JU05)
PV01 AVS/ATE PCB
PL01 VIDEO AMP PCB
From P701 (JS03)
From P701 (JS04)
VIDEO FANCTION SW. QL07 LC4066
QL01~QL06 2SC536SP
QL11 DTC144ES
QL08 DTA114ES
QL09 DTA114ES
QL10 DTA114ES
I BIT DAC QD24 SAA7320
ANALOGUE LEFT CHANNEL POWER SUPPLY
ANALOGUE RIGHT CHANNEL POWER SUPPLY
F.I.R FILTER
DELAY LINE RAM
MULTIPLIER
COEFFICIENT AND CONTROL ROM
ATTENUATOR AND CLIPPER
CLOCKS AND TIMING
CRYSTAL OSCILLATOR POWER SUPPLY
DIGITAL POWER SUPPLY
TEST CONTROLE
I²S INPUT
I²S OUTPUT
x32 INTERPOLATOR AND x2 HOLD
2nd ORDER NOISE SHAPER /QUANTIZER
SWITCHED CAPACITOR NETWORK
11.2896MHz



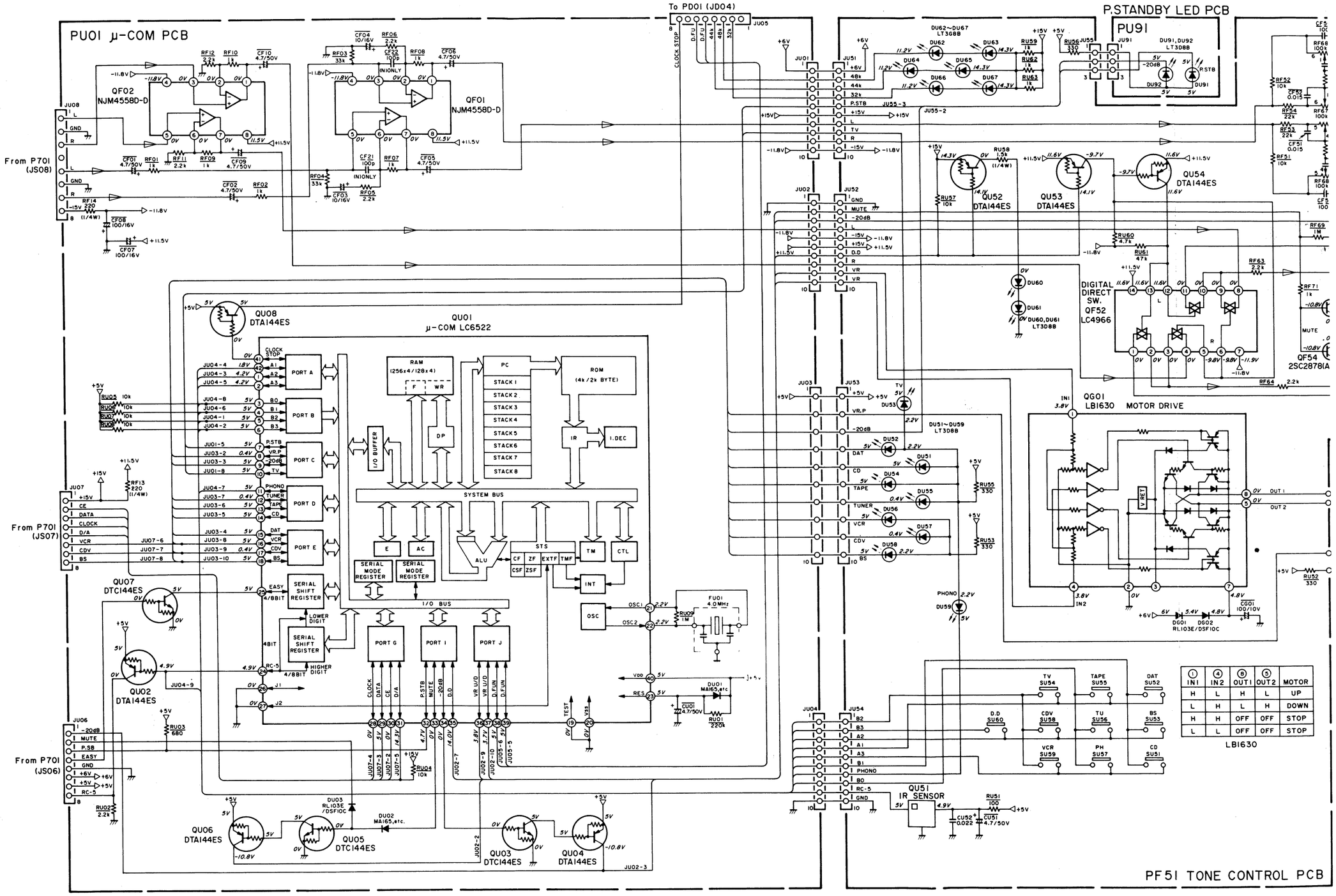


NOTE:

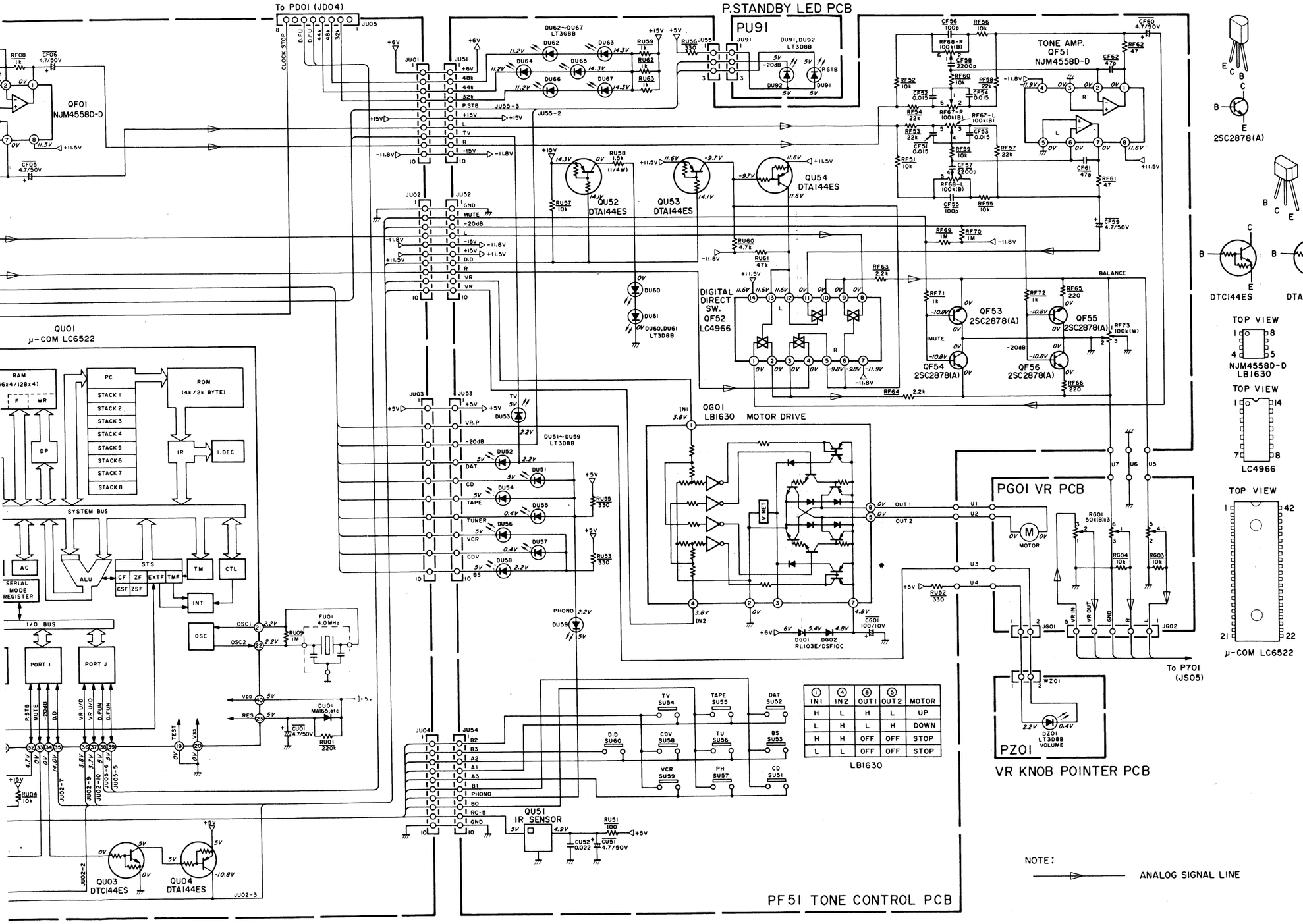
ANALOG SIGNAL LINE

DIGITAL SIGNAL LINE

VIDEO SIGNAL LINE



① IN1	④ IN2	⑧ OUT1	⑤ OUT2	MOTOR
H	L	H	L	UP
L	H	L	H	DOWN
H	H	OFF	OFF	STOP
L	L	OFF	OFF	STOP



① IN1	④ IN2	⑧ OUT1	⑤ OUT2	MOTOR
H	L	H	L	UP
L	H	L	H	DOWN
H	H	OFF	OFF	STOP
L	L	OFF	OFF	STOP

4. CIRCUIT DESCRIPTION FOR SERVICING

4-1 ANALOG CIRCUITRY

The signals applied to the ANALOG FUNCTION inputs (PHONO, TV, CDV, VCR, TUNER, TAPE) goes to the Function IC (QS01 – LC7821). QS01 switches inputs and controls REC OUT based on the serial data from the μ-COM (QU01 – LC6522C). The signal output from QS01 then goes to QS02, which is switched depending on whether the selected function is a digital function (CD OPT, BS, DAT) or analog function. Its output then goes to QS03, which is OFF in case the optional Dolby Surround processor is connected and ON when it is not connected. The output from QS03 passes through amplifier QF01 and tone amp QF51, and goes to QF52. QF52 can be switched only when a digital function is selected by the DIGITAL DIRECT SW. If it is ON, the signal input in the digital form enters 1-bit DAT QD24 to be converted into an analog signal, and this analog output goes to QF52 via line amp QF02, bypassing QS02, QS03, QF01 and the tone amp (QF51). The whole of QF52 is also controlled by the μ-COM.

The output from QF52 passes through the MUTE, BALANCE and VOLUME circuitry. The VOLUME control is a motorized VR under the control of the μ-COM and QG01, and can be varied mechanically up/down by the remote control. The indicator provided on the VR knob flashes during the up/down rotation. The signal output from the VOLUME control circuit is applied to the power amp (Q701), which is a hybrid IC incorporating the L/R 2-channel amp, protection circuitry and relay driver.

- The μ-COM is a microcomputer designed exclusively for this model, and incorporates a 2 KB ROM.

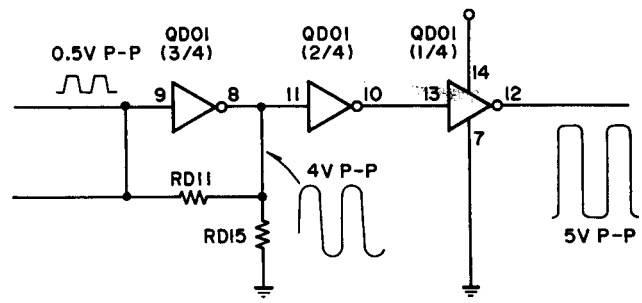
4-2 VIDEO CIRCUITRY

The video signals are switched by QL07, which performs switching by sharing the use of the FUNCTION INDICATOR ports of the μ-COM (QU01). This model is provided with the Sound Injection function allowing arbitrary combinations of video and audio. The combination can be determined by first selecting the required video function (CDV, DBS or VCR), then selecting the required audio function (PHONO, TV, TUNER, TAPE, CD or DAT). However, Sound Injection is not available between two functions having the video input (for example, combination of the CDV video and VCR audio is not possible). When Sound Injection is used, two FUNCTION indicators are lit up simultaneously; this is not malfunction. Also, one of the indicators of the functions having the video input (CDV, DBS, VCR) is always lit up during Sound Injection. The initial Sound Injection condition when the power is switched ON is the combination of TUNER audio and CDV video, and both the TUNER and CDV indicators should be lit in this condition.

4-3 DESCRIPTION OF DIGITAL CIRCUIT OPERATIONS

1) Input Circuit

QD01 (1/4 to 3/4) and QD02 (4/6 to 6/6) make up a circuit which amplifies the 0.5 Vp-p digital signal level to the TTL level of 5 Vp-p and shapes the waveform. The amplifier in the first stage amplifies the signal up to about 4 Vp-p, and the inverter of the second and third stages shapes the waveform and sends the output to the following input selector circuit.



The demodulator (QD06) receives and reproduces the digital audio interface format signal. It incorporates a PLL circuit which is synchronized with the externally-supplied digital audio interface format signal. Therefore, the sampling frequency is automatically set according to the input. QD03

2) Demodulator Circuit

QD03 is the input selector IC, which is controlled by the μ-COM (PU01). The selected signal with the level of 5 Vp-p is sent to the demodulator circuit in the next stage. On the other hand, the selected source signal is also sent to the DAT OUT jack. The output at the DAT OUT jack is 0.5 Vp-p/75 ohms, so the level with no load is 1 Vp-p.

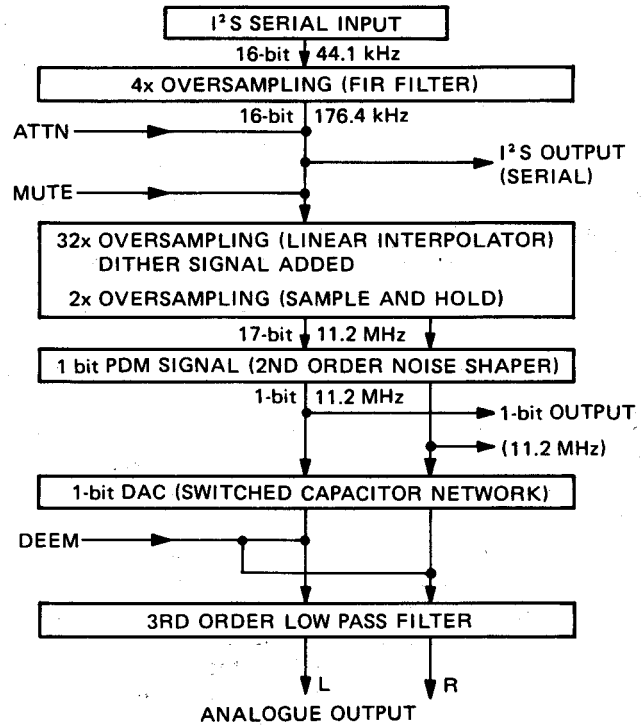
3) 1-Bit DAC QU24 (SAA7320)

The digital circuitry is the same as the previous configuration until the input of the DAC (QD24) (refer to the PM-95 description). The difference of this model lies in the 1-bit DAC used after it. This DAC users a completely different conversion system referred to as the bit stream conversion. This system converts the input data into a pulse train with variable density, supplies it to an LPF and returns it to an analog signal.

FEATURES

- I^2S data input
- 3-stage digital filter incorporating F.I.R. filter, linear interpolator and sample and hold
- 2nd order noise shaper to provide a signal-to-noise ratio of >90 dB
- 16 bit resolution from a 1 bit converter, using switched capacitor integrator
- 3rd order low-pass filter to reduce out-of-band noise
- −12 dB attenutaion, de-emphasis and mute control
- Low power consumption (typ. 300 mW)
- Single supply operation (+5V)
- Operating ambient temperature range of −40°C ~ +85°C

FLOW DIAGRAM OF SAA7320 DATA PATH



MAIN FUNCTIONS IN BIT STREAM D/A CONVERSION

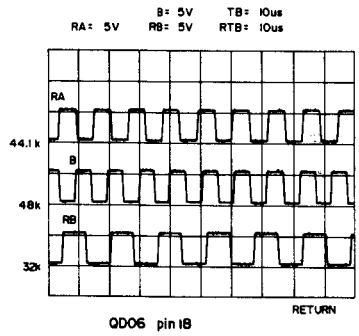
QU24 (SAA7320)

Pin functions

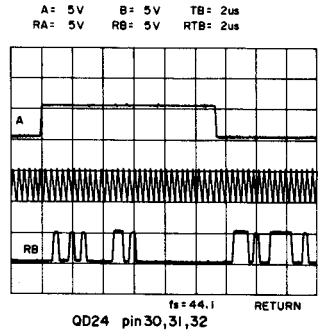
pin no.	symbol	description
1	CDR	Capacitor Damping Right: damping capacitor for the right channel switched-capacitor integrator.
2	DER	De-emphasis Right: connection to the de-emphasis switch in the feedback of the right channel integrator.
3	V_{refR}	Reference voltage Right: reference voltage input for the analogue right channel ground (+2,5 V typ.).
4	V_{SSAR}	Ground: ground connection for the analogue right channel.
5	V_{SSA}	Ground: ground connection for logic in the analogue section.
6	V_{SSAL}	Ground: ground connection for the analogue left channel.
7	V_{refL}	Reference voltage Left: reference voltage input for the analogue left channel ground (+2,5 V typ.).
8	DEL	De-emphasis Left: connection to the de-emphasis switch in the feedback of the left channel integrator.
9	CDL	Capacitor Damping Left: damping capacitor for the left channel switched-capacitor integrator.
10	INTL	Integrator Left: output from the left channel switched-capacitor integrator.
11	V_{DDAL}	Power Supply: +5 V supply voltage for the analogue left channel.
12	OALI−	Operational Amplifier Left Input −: inverting input to the left channel low-pass filter operational amplifier.
13	OALI+	Operational Amplifier Left Input +: non-inverting input to the left channel low-pass filter operational amplifier.
14	OALO	Operation Amplifier Left Output: output from the left channel operational amplifier.
15	V_{DDref}	Power Supply: +5 V supply voltage for the reference voltage generator.
16	VRO	Reference Voltage Output: internal reference voltage output (+2,5 V typ.).

pin no.	symbol	description
17	VRC	Reference Voltage Capacitor: internal reference voltage high impedance node requiring an external smoothing capacitor.
18	TEST4	Test output 4: pin should be left open-circuit.
19	DAO	I^2S Serial Data Output: is a 16-bit linear two's-complement PCM signal at a data rate of 176,4 kHz (typ.) formatted in accordance with I^2S. After 4 x upsampling by the digital filter this signal is output so that an external DAC could be used; combined with CLO and WSO it can be considered as a master transmitter.
20	CLO	I^2S Serial bit Clock Output: f_{CLO} = 5,6448 MHz typ.
21	WSO	I^2S Word Select Output: 176,4 kHz typ.
22	V_{DD1}	Power supply: +5 V supply voltage for the digital section.
23	V_{DD2}	Power Supply: +5 V supply voltage for the crystal oscillator.
24	XTAL2	Crystal oscillator output: drive output to clock crystal.
25	XTAL1	Crystal oscillator input: input from crystal oscillator or external clock input (11,2896 MHz typ.).
26	XSYS	System clock output: buffered output from crystal oscillator
27, 28	V_{SS}	Ground: ground connection for the digital section.
29	TEST1	Test input 1: pin should be connected to ground.
30	WSI	I^2S Word Select Input: 44,1 kHz typ. WSI together with CLI, is used to clock the I^2S serial data input (DAI) and synchronize the main timing chain.
31	CLI	I^2S Serial bit Clock Input: f_{CLI} = 2,8224 MHz typ.
32	DAI	I^2S Serial Data Input: is a 16-bit linear two's-complement PCM signal formatted in accordance with I^2S. If more than 16 bits are supplied then the least significant bits (LSBs) will be truncated.
33	n.c.	not connected.
34	DEC	De-emphasis Control: this input switches an extra external capacitor network into both the analogue left and right channel integrator feedback.
35	MUTE	Mute: when active LOW this Schmitt trigger control input will force the interpolator data input to zero. It will also force the I^2S data output (DAO) to zero.
36	ATT	Attenuation: when active LOW this control input provides −12 dB attenuation to the analogue output amplitude.
37	TEST2	Test output 2: pin should be left open-circuit.
38	TEST3	Test output 3: pin should be left open-circuit.
39	V_{DDA}	Power Supply: +5 V supply voltage for logic in the analogue section.
40	OARO	Operational Amplifier Right Output: output from the right channel operational amplifier.
41	OARI+	Operational Amplifier Right Input +: non-inverting input to the right channel low-pass filter operational amplifier.
42	OARI−	Operational Amplifier Right Input −: inverting input to the right channel low-pass filter operational amplifier.
43	V_{DDAR}	Power Supply: +5 V supply voltage for the analogue right channel.
44	INTR	Integrator Right: output from the right channel switched-capacitor integrator.

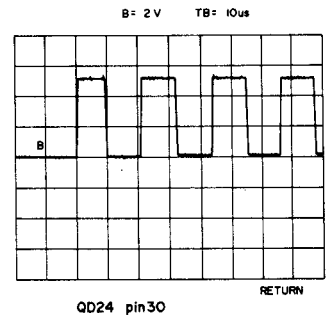
4) Waveform of Main Port



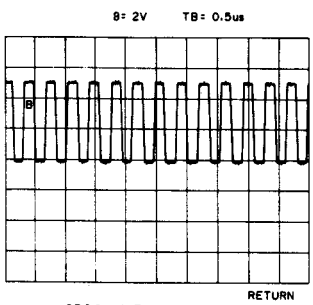
QD06 pin18



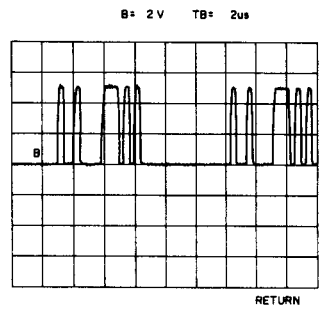
QD24 pin30,31,32



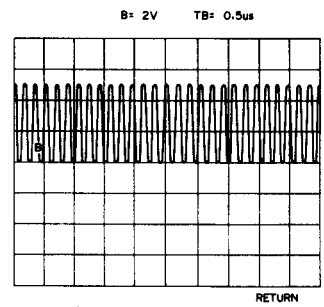
QD24 pin30



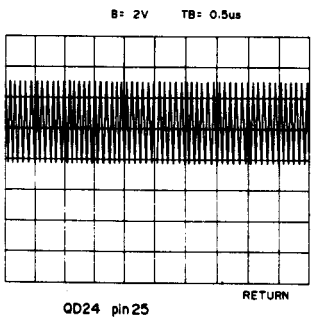
QD24 pin31



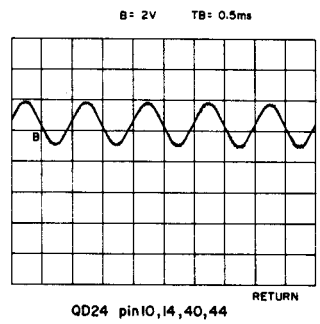
QD24 pin32



QD13 pin13



QD24 pin25



QD24 pin10,14,40,44

5. TEST EQUIRED SERVICING

This table lists the test equipment required for servicing the Model PM593 Digital Audio/Video Master Amplifier

Item	Use
Distortion Analyzer	Distortion measurements
Audio Oscillator	Sinewave and squarewave signal source
ACVTVM	Voltage measurements (AC)
Oscilloscope	Waveform analysis and trouble shooting and ASO aignment
Circuit Tester	Trouble shooting
DCVTVM	Voltage measurements (DC)
AC Wattmeter	Monitors primary power to amplifier
Line Voltmeter	Monitors potential of primary power to amplifier
Variable Autotransformer	Adjust level of primery power to amplifier
Shorting Plug	Shorts amplifier input to eliminate noise pickup

REF. DESIG.	PART NO.	DESCRIPTION
		PD00-MISCELLANEOUS
LD01	4822 157 53801	Choke Coil 47μH
LD02	4822 157 53801	Choke Coil 47μH
LD03		Filter
LD04	4822 157 53801	Choke Coil 47μH
LD05	4822 142 60388	Pulse Transformer
XD01	4822 242 72334	Crystal 16.9344MHz
		PF51-TONE CONTROL CIRCUIT BOARD
		PF51-CAPACITORS
CF63	4822 122 40491	Ceramic 0.022μF +80% −20%
CU52	4822 122 40491	Ceramic 0.022μF +80% −20%
		PF51-RESISTORS
RF67	4822 101 30582	100KΩ(B), Variable
RF68	4822 101 30582	100KΩ(B), Variable
RF73	4822 101 30581	100KΩ(W), Variable
RU58	5322 116 53478	1.5KΩ ±5% ¼W
		PF51-SEMICONDUCTORS
DG01	4822 130 32508	Diode RL103E/DSF10C
DG02	4822 130 32508	Diode RL103E/DSF10C
DU51 ~ DU61	4822 130 80326	L.E.D. LT3D8B, RED 30
DU62 ~ DU67	4822 130 80327	L.E.D. LT3G8B, GREEN 30
QF51	4822 209 83631	IC NJM4558D-D
QF52	4822 209 83804	IC LC4966
QF53	4822 130 43818	Transistor 2SC2878(A)
QF54	4822 130 43818	Transistor 2SC2878(A)
QF55	4822 130 43818	Transistor 2SC2878(A)
QF56	4822 130 43818	Transistor 2SC2878(A)
QG01	4822 209 73287	IC LB1630
QU51	4822 130 10009	Photo Unit, IR SENSOR
QU52	4822 130 42682	Transistor, Digital DTA144ES
QU53	4822 130 42682	Transistor, Digital DTA144ES
QU54	4822 130 42682	Transistor, Digital DTA144ES
		PF51-MISCELLANEOUS
SU51 ~ SU60	4822 276 12455	Push Switch, Tact
		PG01-VOLUME CIRCUIT BOARD
RG01	4822 101 30583	Variable Resistor 50KΩ(B)x3, Motor
		PL01-VIDEO AMP CIRCUIT BOARD
QL01 ~ QL06	4822 130 42298	Transistor 2SC536SP, etc.
QL07	4822 209 83067	IC LC4066
QL08	4822 130 61227	Transistor, Digital DTA114ES
QL09	4822 130 61227	Transistor, Digital DTA114ES
QL10	4822 130 61227	Transistor, Digital DTA114ES
QL11	4822 130 42594	Transistor, Digital DTC144ES

REF. DESIG.	PART NO.	DESCRIPTION
		PP01-POWER SWITCH CIRCUIT BOARD
⚠ GP01 ~ ⚠ GP04	4822 122 33276	Ceramic Cap. 0.01μF ±20%
⚠ RP01	5322 116 55263	820Ω ±5% 1W
⚠ DP01	4822 130 32508	Diode RL103E/DSF10C
⚠ LP01	4822 280 20222	Relay DH24D1-0
⚠ SP01	4822 276 12533	Push Switch, Power
		PP51-AC OUTLET CIRCUIT BOARD [N, A, T]
⚠ FP51	4822 253 40166	Fuse T2.5A [N]
JP53	4822 256 30207	Jack, Fuse Holder [N]
JP54	4822 256 30207	Jack, Fuse Holder [N]
⚠ J021	4822 267 30597	Jack, AC Outlet [N, A]
	4822 265 30606	Jack, AC Outlet [T]
⚠ J022	4822 267 30597	Jack, AC Outlet [N, A]
	4822 265 30606	Jack, AC Outlet [T]
		PU01-μ-CON CIRCUIT BOARD
		PU01-RESISTORS
RF13	4822 116 52849	220Ω ±5% ¼W
RF14	4822 116 52849	220Ω ±5% ¼W
		PU01-SEMICONDUCTORS
QF01	4822 209 83631	IC NJM4558D-D
QF02	4822 209 83631	IC NJM4558D-D
DU01	4822 130 33305	Diode MA165, etc.
DU02	4822 130 33305	Diode MA165, etc.
DU03	4822 130 32508	Diode RL103E/DSF10C
QU01	4822 209 61537	Microprocessor LC6522
QU02	4822 130 42682	Transistor, Digital DTA144ES
QU03	4822 130 42594	Transistor, Digital DTC144ES
QU04	4822 130 42682	Transistor, Digital DTA144ES
QU05	4822 130 42594	Transistor, Digital DTC144ES
QU06	4822 130 42682	Transistor, Digital DTA144ES
QU07	4822 130 42594	Transistor, Digital DTC144ES
QU08	4822 130 42682	Transistor, Digital DTA144ES
		PU01-MISCELLANEOUS
FU01	4822 242 72223	Ceramic Vibrator CST4.00MGW
		PU91-P. STANDBY CIRCUIT BOARD
DU91	4822 130 80326	L.E.D. LT3D8B RED 30
DU92	4822 130 80326	L.E.D. LT3D8B RED 30
		PV01-REAR TERMINAL CIRCUIT BOARD
RL01	4822 111 41355	Resistor 75Ω ±5% 1/6W
RL02	4822 111 41355	Resistor 75Ω ±5% 1/6W
RL21	4822 111 41355	Resistor 75Ω ±5% 1/6W
RL22	4822 111 41355	Resistor 75Ω ±5% 1/6W
RL23	4822 111 41355	Resistor 75Ω ±5% 1/6W

REF. DESIG.	PART NO.	DESCRIPTION
JL01	4822 265 20449	Terminal, 1P; RCA
JL02	4822 265 30763	Terminal, 4P; RCA
JV01	4822 266 30315	Terminal, 15P
JV02	4822 266 30306	Terminal, 13P
JV03	4822 266 30306	Terminal, 13P
		PW01-HEADPHONE JACK CIRCUIT BOARD
RW01	4822 111 50474	Resistor 330Ω ±5% 1W
RW02	4822 111 50474	Resistor 330Ω ±5% 1W
JW01	4822 267 31033	Jack, Headphone
		PZ01-VR KNOB POINTER CIRCUIT BOARD
DZ01	4822 130 80326	L.E.D. LT3D8B
		P701-MAIN AMP CIRCUIT BOARD
		P701-CAPACITORS
CS01	4822 122 32486	Ceramic 0.01μF +80% −20%
CS02	4822 122 32486	Ceramic 0.01μF +80% −20%
⚠C715		Elect 10μF 50V, BP
⚠C716		Elect 10μF 50V, BP
⚠C717		Elect 10μF 50V, BP
C718	4822 124 41135	Elect 10μF 100V
C723	4822 122 32486	Ceramic 0.01μF +80% −20%
C724	4822 122 32486	Ceramic 0.01μF +80% −20%
C727	4822 122 32486	Ceramic 0.01μF +80% −20%[N]
C728	4822 122 32486	Ceramic 0.01μF +80% −20%[N]
C729	4822 122 40491	Ceramic 0.022μF +80% −20%
C801	4822 122 30043	Ceramic 0.01μF +80% −20%
C802	4822 124 41603	Elect 4700μF 50V
C803	4822 124 41603	Elect 4700μF 50V
C804	4822 122 32486	Ceramic 0.01μF +80% −20%
C805	4822 122 32486	Ceramic 0.01μF +80% −20%
C814	4822 122 40491	Ceramic 0.022μF +80% −20%
		P701-RESISTORS
R711	4822 116 60204	4.7Ω ±5% 1W
R712	4822 116 60204	4.7Ω ±5% 1W
⚠R715	4822 115 90167	100Ω ±1% ¼W, Fuse
⚠R716	4822 115 90167	100Ω ±1% ¼W, Fuse
⚠R719	4822 116 52115	680Ω ±5% 1W
⚠R802	4822 115 90166	10Ω ±1% ¼W, Fuse
⚠R808	5322 116 55263	820Ω ±5% 1W
		P701-SEMICONDUCTORS
D701	4822 130 32508	Diode RL103E/DSF10C
D702	4822 130 32508	Diode RL103E/DSF10C
⚠D703	4822 130 32508	Diode RL103E/DSF10C
⚠D801	4822 130 31007	Diode S4VB-20
D802	4822 130 80907	Diode S2VB
D804	4822 130 33305	Diode 1SS176, etc.
⚠D805 ~ ⚠D809	4822 130 32508	Diode RL103E/DSF10C

REF. DESIG.	PART NO.	DESCRIPTION
QS01	4822 209 72748	IC LC7821
QS02	4822 209 83804	IC LC4966
QS03	4822 209 83804	IC LC4966
QS04	4822 130 42682	Transistor, Digital DTA144ES
QS05	4822 130 42682	Transistor, Digital DTA144ES
QS06	4822 130 42298	Transistor 2SC536SP, etc.
Q401	4822 209 83631	IC NJM4558D-D
⚠Q701	4822 209 73988	IC STK4164-MKII
Q702	4822 130 42682	Transistor, Digital DTA144ES
Q703	4822 130 43233	Transistor 2SC2240(GR, BL)
Q704	4822 130 42951	Transistor 2SA970(GR, BL)
⚠Q801		IC NJM7815FA
Q802	4822 130 60321	Transistor 2SD1273(P, O)
⚠Q803	4822 209 61526	IC NJM79M15FA
⚠Q804	4822 209 61533	IC NJM7806FA
⚠Q805		IC NJM79M06FA
⚠Q806	4822 209 60826	IC NJM7812FA
⚠Q808		IC NJM7818FA
Q809	4822 130 60588	Transistor, Digital DTC114ES
Q810	4822 130 42298	Transistor 2SC536SP, etc.
⚠Q811	4822 209 71903	IC NJM7805FA
		P701-MISCELLANEOUS
⚠F801	4822 253 30191	Fuse T1.6A 250V
⚠F802	4822 253 30191	Fuse T1.6A 250V
JS01	4822 265 30457	Terminal, 6P; RCA
JS02	4822 267 30493	Terminal, 4P; RCA
J401	4822 265 30397	Terminal, 4P; RCA
J701	4822 290 60752	Terminal, Speaker
L701	4822 157 53898	Coil, Speaker
L702	4822 157 53898	Coil, Speaker
L703	4822 280 20197	Relay DH2SU
L801	4822 280 20197	Relay DH2SU

NOTE ON SAFETY:
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.